CW

Home Assignment

1. Work done = Force × Displacement
$F = ma$ and $s = \frac{1}{2}at^2$
Using, $s = ut + \frac{1}{2}at^2$
$W = ma \times \frac{1}{2}at^2$
$= \frac{1}{2}ma^2t^2$
$= \frac{1}{2}m\left(\frac{v}{t_1}\right)^2 t^2$ [using $a = \frac{v}{t_1}$]
$= \frac{1}{2}m\frac{v^2}{t_1^2}t^2$. [Ans]

2. Acceleration of the body is $a = \frac{F}{m}$
Speed after two seconds is $v = at = \frac{2F}{m}$
$\therefore$ Power $= F \times v = F \times \frac{2F}{m} = \frac{2F^2}{m}$ (Ans)

3. Power $= Fv = 100 \times 20 = 2000$ W (Ans)

4. The ball dropped at the height $(h) = 10$ m
$g = 10 m/s^2$
Total energy of the ball $= mgh$
$= m \times 10 \times 10$
$= 100m$ J
The ball loses 40% of its initial energy on striking the ground level $= \frac{40}{100} \times 100$ MJ
$= 40$ MJ
Energy left to hit the ground $= 100 - 40$ MJ
$\therefore$, Final Energy $= 60$ MJ
Height $= \frac{60}{10} = 6$ m [Ans]

Date
Page 190

5(a) The law of conservation of energy states that the amount of energy is neither created nor destroyed
Ex ⇒ When you roll a toy car down a ramp & it hits a wall, the energy is transferred from kinetic energy to potential energy.

(b) Girl A Power = $\frac{\text{Work}}{\text{Time}} = \frac{mgh}{t} = \frac{40 \times 8}{20} = 160$ W

Girl B Power = $\frac{\text{Work}}{\text{Time}} = \frac{mgh}{t} = \frac{400 \times 8}{50} = 8 \times 8 = 64$ W

The power of Girl A is 160 W & the power of Girl B is 64 W.

(c) Energy = Power x Time
If, Power = 1500 Watt and Time = 10 hours
Then, Energy = 1500 W x 10 Hours = 15000 Watt/h
= 15000 J

6(a) Work = The Change in Kinetic Energy = $\frac{1}{2}mv^2 - \frac{1}{2}mu^2$
Mass of car = 1500 kg
Initial Velocity = 36 km/h = $36 \times \frac{5}{18}$ = 10 m/s
Final Velocity = 72 km/h = $72 \times \frac{5}{18}$ = 20 m/s
Work done = $\frac{1}{2}mv^2 - \frac{1}{2}mu^2 = \frac{1}{2}m(v^2 - u^2)$
$= \frac{1}{2} \times 1500 (400 - 100)$
$= 750 \times 300$
$= 225000$ J
The work done have positive magnitude

Cw

101

b) The maximum potential energy is at the extreme positions & the maximum kinetic energy is at the mean position